

## PNP SILICON LOW POWER TRANSISTOR

Qualified per MIL-PRF-19500/323

### DEVICES

**2N3250A**  
**2N3250AUB**

**2N3251A**  
**2N3251AUB**

### LEVELS

**JAN**  
**JANTX**  
**JANTXV**

### ABSOLUTE MAXIMUM RATINGS ( $T_C = +25^\circ\text{C}$ unless otherwise noted)

| Parameters / Test Conditions                                                                                        | Symbol         | Value       | Unit             |
|---------------------------------------------------------------------------------------------------------------------|----------------|-------------|------------------|
| Collector-Emitter Voltage                                                                                           | $V_{CEO}$      | 60          | Vdc              |
| Collector-Base Voltage                                                                                              | $V_{CBO}$      | 60          | Vdc              |
| Emitter-Base Voltage                                                                                                | $V_{EBO}$      | 5.0         | Vdc              |
| Collector Current                                                                                                   | $I_C$          | 200         | mAdc             |
| Total Power Dissipation<br>@ $T_A = +25^\circ\text{C}$ <sup>(1)</sup><br>@ $T_C = +25^\circ\text{C}$ <sup>(1)</sup> | $P_T$          | 0.36<br>1.2 | W                |
| Operating & Storage Junction Temperature Range                                                                      | $T_J, T_{stg}$ | -65 to +200 | $^\circ\text{C}$ |

### THERMAL CHARACTERISTICS

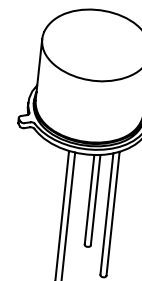
| Parameters / Test Conditions         | Symbol                         | Max. | Unit               |
|--------------------------------------|--------------------------------|------|--------------------|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ <sup>(1)</sup> | 150  | $^\circ\text{C/W}$ |

#### Note:

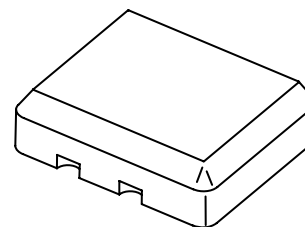
1/ Consult 19500/323 for thermal curves

### ELECTRICAL CHARACTERISTICS ( $T_A = +25^\circ\text{C}$ , unless otherwise noted)

| Parameters / Test Conditions                                                                                                                                     | Symbol        | Min. | Max.     | Unit                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------|----------|-------------------------------------|
| <b>OFF CHARACTERISTICS</b>                                                                                                                                       |               |      |          |                                     |
| Collector-Emitter Breakdown Voltage<br>$I_C = 10\text{mAdc}$                                                                                                     | $V_{(BR)CEO}$ | 60   |          | Vdc                                 |
| Collector-Emitter Cutoff Voltage<br>$V_{BE} = 3.0\text{Vdc}, V_{CE} = 40\text{Vdc}$<br>$V_{BE} = 3.0\text{Vdc}, V_{CE} = 40\text{Vdc}$ $T_A = 150^\circ\text{C}$ | $I_{CEX}$     |      | 20<br>20 | $\eta\text{Adc}$<br>$\mu\text{Adc}$ |
| Collector-Base Cutoff Current<br>$V_{CB} = 60\text{Vdc}$<br>$V_{CB} = 40\text{Vdc}$                                                                              | $I_{CBO}$     |      | 10<br>20 | $\mu\text{Adc}$<br>$\eta\text{Adc}$ |
| Emitter-Base Cutoff Current<br>$V_{EB} = 5.0\text{Vdc}$                                                                                                          | $I_{EBO}$     |      | 10       | $\mu\text{Adc}$                     |
| Collector-Emitter Cutoff Voltage<br>$V_{BE} = 3.0\text{Vdc}, V_{CE} = 40\text{Vdc}$                                                                              | $I_{BEX}$     |      | 50       | $\eta\text{Adc}$                    |



TO-39 (TO-205AD)



UB Package

**ELECTRICAL CHARACTERISTICS ( $T_A = +25^\circ\text{C}$ , unless otherwise noted) (CONT.)**

| Parameters / Test Conditions                                                                                                     | Symbol        | Min.      | Max.         | Unit |
|----------------------------------------------------------------------------------------------------------------------------------|---------------|-----------|--------------|------|
| <b>ON CHARACTERISTICS <sup>(2)</sup></b>                                                                                         |               |           |              |      |
| Forward-Current Transfer Ratio<br>$I_C = 0.1\text{mA}$ , $V_{CE} = 1.0\text{Vdc}$<br>2N3250A, AUB<br>2N3251A, AUB                | $h_{FE}$      | 40<br>80  |              |      |
| $I_C = 1.0\text{mA}$ , $V_{CE} = 1.0\text{Vdc}$<br>2N3250A, AUB<br>2N3251A, AUB                                                  |               | 45<br>90  |              |      |
| $I_C = 10\text{mA}$ , $V_{CE} = 1.0\text{Vdc}$<br>2N3250A, AUB<br>2N3251A, AUB                                                   |               | 50<br>100 | 150<br>300   |      |
| $I_C = 50\text{mA}$ , $V_{CE} = 1.0\text{Vdc}$<br>2N3250A, AUB<br>2N3251A, AUB                                                   |               | 15<br>30  |              |      |
| $I_C = 1.0\text{mA}$ , $V_{CE} = 1.0\text{Vdc}$<br>$T_A = -55^\circ\text{C}$<br>2N3250A, AUB<br>2N3251A, AUB                     |               | 20<br>40  |              |      |
| Collector-Emitter Saturation Voltage<br>$I_C = 10\text{mA}$ , $I_B = 1.0\text{mA}$<br>$I_C = 50\text{mA}$ , $I_B = 5.0\text{mA}$ | $V_{CE(sat)}$ |           | 0.25<br>0.50 | Vdc  |
| Base-Emitter Saturation Voltage<br>$I_C = 10\text{mA}$ , $I_B = 1.0\text{mA}$<br>$I_C = 50\text{mA}$ , $I_B = 5.0\text{mA}$      | $V_{BE(sat)}$ | 0.60      | 0.90<br>1.20 | Vdc  |

**DYNAMIC CHARACTERISTICS**

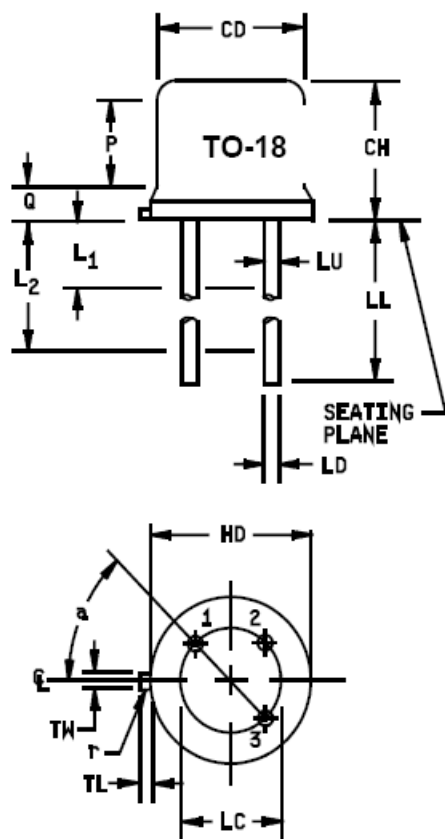
| Parameters / Test Conditions                                                                                                                                                                 | Symbol     | Min.       | Max.       | Unit |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------|------------|------|
| Small-Signal Short-Circuit Forward Current Transfer Ratio<br>$I_C = 1.0\text{mA}$ , $V_{CE} = 10\text{Vdc}$ , $f = 1.0\text{kHz}$<br>2N3250A, AUB<br>2N3251A, AUB                            | $h_{fe}$   | 50<br>100  | 200<br>400 |      |
| Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio<br>$I_C = 10\text{mA}$ , $V_{CE} = 20\text{Vdc}$ , $f = 100\text{kHz}$<br>2N3250A, AUB<br>2N3251A, AUB | $ h_{fe} $ | 2.5<br>3.0 | 9.0<br>9.0 |      |
| Output Capacitance<br>$V_{CB} = 10\text{Vdc}$ , $I_E = 0$ , $100\text{kHz} \leq f \leq 1.0\text{MHz}$                                                                                        | $C_{obo}$  |            | 6.0        | pF   |
| Input Capacitance<br>$V_{EB} = 1.0\text{Vdc}$ , $I_C = 0$ , $100\text{kHz} \leq f \leq 1.0\text{MHz}$                                                                                        | $C_{ibo}$  |            | 8.0        | pF   |

**SWITCHING CHARACTERISTICS**

| Parameters / Test Conditions                                                                                                       | Symbol    | Min. | Max.       | Unit           |
|------------------------------------------------------------------------------------------------------------------------------------|-----------|------|------------|----------------|
| Turn-On Time<br>$V_{CC} = 3.0\text{Vdc}$ ; $I_C = 10\text{mA}$ ; $I_{B1} = 1.0\text{mA}$                                           | $t_{on}$  |      | 70         | $\eta\text{s}$ |
| Turn-Off Time<br>$V_{CC} = 3.0\text{Vdc}$ ; $I_C = 10\text{mA}$ ; $I_{B1} = I_{B2} = 1.0\text{mA}$<br>2N3250A, AUB<br>2N3251A, AUB | $t_{off}$ |      | 250<br>300 | $\eta\text{s}$ |

(2) Pulse Test: Pulse Width = 300 $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$

## PACKAGE DIMENSIONS

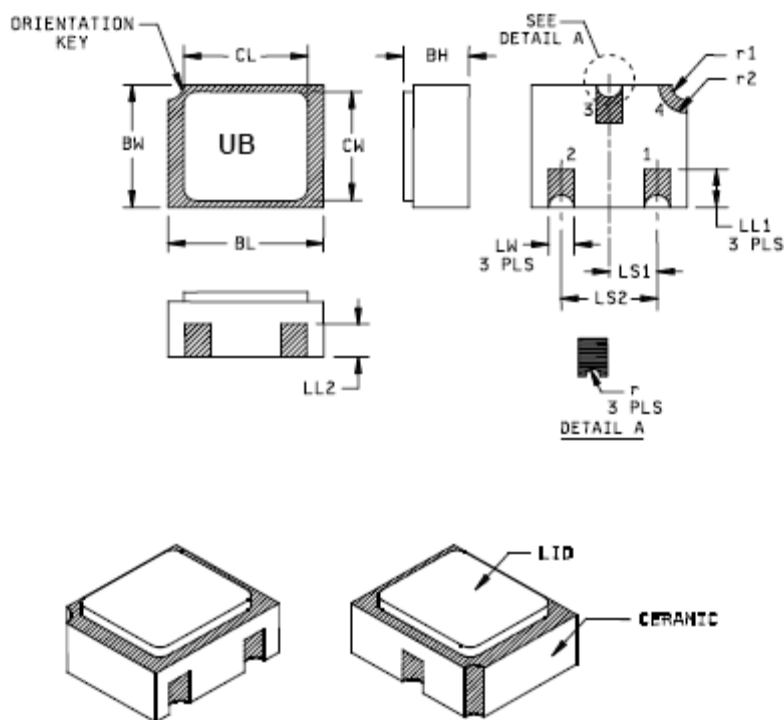


| Symbol   | Dimensions |      |             |       | Notes |
|----------|------------|------|-------------|-------|-------|
|          | Inches     |      | Millimeters |       |       |
|          | Min        | Max  | Min         | Max   |       |
| CD       | .178       | .195 | 4.52        | 4.95  |       |
| CH       | .170       | .210 | 4.32        | 5.33  |       |
| HD       | .209       | .230 | 5.31        | 5.74  |       |
| LC       | .100TP     |      | 2.54 TP     |       | 6     |
| LD       | .016       | .021 | 0.41        | 0.53  | 7, 8  |
| LL       | .500       | .750 | 12.70       | 19.05 | 7, 8  |
| LU       | .016       | .019 | 0.41        | 0.48  | 7, 8  |
| L1       |            | .050 |             | 1.27  | 7, 8  |
| L2       | .250       |      | 6.35        |       | 7, 8  |
| P        | .100       |      | 2.54        |       |       |
| Q        |            | .040 |             | 1.02  | 5     |
| TL       | .028       | .048 | 0.71        | 1.22  | 3, 4  |
| TW       | .036       | .046 | 0.91        | 1.17  | 3     |
| r        |            | .010 |             | 0.25  | 10    |
| $\alpha$ | 45° TP     |      | 45° TP      |       | 6     |
|          |            |      |             |       |       |

### NOTES:

1. Dimension are in inches.
2. Millimeters are given for general information only.
3. Beyond r (radius) maximum, TH shall be held for a minimum length of .011 inch (0.28 mm).
4. Dimension TL measured from maximum HD.
5. Body contour optional within zone defined by HD, CD, and Q.
6. Leads at gauge plane .054 +.001 -.000 inch (1.37 +0.03 -0.00 mm) below seating plane shall be within .007 inch (0.18 mm) radius of true position (TP) at maximum material condition (MMC) relative to tab at MMC. The device may be measured by direct methods or by the gauge and gauging procedure shown in figure 2.
7. Dimension LU applies between L1 and L2. Dimension LD applies between L2 and LL minimum. Diameter is uncontrolled in L1 and beyond LL minimum.
8. All three leads.
9. The collector shall be internally connected to the case.
10. Dimension r (radius) applies to both inside corners of tab.
11. In accordance with ASME Y14.5M, diameters are equivalent to  $\phi$ x symbology.
12. Lead 1 = emitter, lead 2 = base, lead 3 = collector.

**FIGURE 1.** Physical dimensions (similar to TO-18).



| Ltr.            | Dimensions |      |             |      | Note | Ltr.            | Dimensions |      |             |      | Note |
|-----------------|------------|------|-------------|------|------|-----------------|------------|------|-------------|------|------|
|                 | Inches     |      | Millimeters |      |      |                 | Inches     |      | Millimeters |      |      |
|                 | Min        | Max  | Min         | Max  |      |                 | Min        | Max  | Min         | Max  |      |
| BH              | .046       | .056 | 1.17        | 1.42 |      | LS <sub>1</sub> | .035       | .039 | 0.89        | 0.99 |      |
| BL              | .115       | .128 | 2.92        | 3.25 |      | LS <sub>2</sub> | 0.71       | .079 | 1.80        | 2.01 |      |
| BW              | .085       | .108 | 2.16        | 2.74 |      | LW              | .016       | .024 | 0.41        | 0.61 |      |
| CL              |            | .128 |             | 3.25 |      | r               |            | .008 |             | 0.20 |      |
| CW              |            | .108 |             | 2.74 |      | r <sub>1</sub>  |            | .012 |             | 0.31 |      |
| LL <sub>1</sub> | .022       | .038 | 0.56        | 0.96 |      | r <sub>2</sub>  |            | .022 |             | 0.56 |      |
| LL <sub>2</sub> | .017       | .035 | 0.43        | 0.89 |      |                 |            |      |             |      |      |

## NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Hatched areas on package denote metallized areas
4. Pad 1 = Base, Pad 2 = Emitter, Pad 3 = Collector, Pad 4 = Shielding connected to the lid.
5. In accordance with ASME Y14.5M, diameters are equivalent to  $\phi$ x symbology.

**FIGURE 2.** Physical dimensions, surface mount (UB version).